the lens starts at 100% of the basic spherical power at the center of the lens on the left side of the graph, and then progressively drops as the percentage of full pupil increases, to approximately 10% of the basic spherical prescription at 100% of full pupil.

Graph **66** should be similar to a graph for the alternate embodiment mentioned hereinabove wherein the central area is a circular disc with the basic distance prescription surrounded by a plurality of annular rings with increasing or changing values of optical power, increasingly more minus or less plus as the radius increases from the center to provide a systematic change of power.

The lenses of the present invention function by mediating the spherical aberration of the patient's eye. Since the combination of a contact lens and an eye system is always a net positive system, the polarity of the designs of the present invention does not change if the contact lens power is plus or minus.

One object of the present invention is to start with concentric annular ring multifocal lens designs as illustrated in FIGS. **2–5**, and then use in vivo image quality analysis equipment, such as an aberroscope or MTF point spread apparatus, to evaluate, identify and quantify any residual aberrations. These residual aberrations can then be reduced further by aspherization of preferably the nonconcentric surface of the lens, or alternatively by aspherization of the concentric surface of the lens, to improve visual performance and acuity.

Thus, the present invention provides an improvement in the performance of designs for spherical ametropia, presbyopia, or astigmatism which is accomplished by a reduction of aberrations of the combination of the lens and the eye system. The reduction in aberrations does not correct the ametropia by itself. First, a subject (or population) is fitted with a concentric lens, and then the subject (or population) is tested with an in vivo image quality device to determine residual aberrations with the lens in place on the eye. Next, the lens is redesigned, such as by the addition of more minus power spherical annular rings, to decrease the measured residual aberrations.

Obviously, many different embodiments of the present invention are possible, with alterations of the number of annular rings, the widths and arrangement of the annular rings, and the optical powers assigned to each of the annular rings.

While several embodiments and variations of the present invention for concentric single vision lens designs are described in detail herein, it should be apparent that the disclosure and teachings of the present invention will suggest many alternative designs to those skilled in the art.

What is claimed is:

1. A concentric annular ring, single vision lens which focuses light rays passing through annular portions of the periphery of the lens at the same focal plane as light rays passing through the center of the lens, thereby increasing the quality of the lens image and improving its depth-of-focus, comprising:

a. a single vision lens, said lens having a front surface and an opposite back surface, wherein one of the front and back surfaces defines a central area comprising a circular disc having a surface corresponding to a basic prescriptive spherical refractive power which focuses light rays passing through said central area at a particular focal plane; and

b. a plurality of annular rings surrounding the central area, some of which comprise sphere power annular rings which have a surface corresponding to the basic prescriptive spherical refractive power and some of which comprise sphere' power annular rings which have a surface corresponding to a less plus or greater minus refractive power relative to said basic prescriptive spherical refractive power, whereby light rays passing through said sphere' power annular rings are focused at the same focal plane as light rays passing through said central area to mediate spherical aberration and improve visual acuity, and whereby light rays passing through said sphere power annular rings will focus in front of light rays passing through said central area.

2. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein the plurality of annular rings comprise spherical annular rings.

3. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **2**, wherein the circular disc has a spherical curve.

4. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein the plurality of annular rings comprise aspheric annular rings.

5. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **4**, wherein the circular disc has an aspheric curve.

6. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein the lens comprises a contact lens to be worn on the cornea of the eye.

7. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **6**, wherein the contact lens comprises a soft hydrogel contact lens.

8. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein the lens comprises an intraocular lens.

9. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein all of said sphere' power annular rings have a surface corresponding to a less plus refractive power relative to said basic prescriptive spherical refractive power for a hyperopic prescription.

10. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein all of said sphere' power annular rings have a surface corresponding to a greater minus refractive power relative to said basic prescriptive spherical refractive power for a myopic prescription.

11. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein said sphere power and sphere' power annular rings alternate.

12. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **11**, wherein the widths of individual annular rings are different to generate a power profile which varies to generate different amounts of minus power with increasing distance from the center.

13. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein the central area and the plurality of annular rings are formed on the back surface of the lens to minimize flare and glare problems.

14. A concentric annular ring, single vision lens with improved depth-of-focus as claimed in claim **1**, wherein the plurality of sphere' power annular rings have increasing values of optical power, increasingly more minus or less plus as the radius increases from the center to provide a systematic change of power.

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